THE NUMBER OF MOLTS OF THE FIRE BRAT (LEPISMATIDAE, THYSANURA).

By Harvey L. Sweetman and F. W. Whittemore*

It is well established that certain insects as the Plecoptera Odonata, and Ephemeroptera have 20 or more molts. A recent paper by Ide (1935) suggests that at least one species of may fly has between 40 and 45 molts, and another about 30. A study of the fire brat has revealed that this species exceeds these figures during the life of long-living individuals. However, no definite number of molts can be assigned to the species to reach adulthood. The fire brat molts at frequent intervals and grows throughout much of its life (Sweetman, 1934). The writers have used an arbitrary criterion for assigning adulthood to the females. When the ovipostor becomes visible from a dorsal view, the females are considered mature.

The data shown in the table were secured from observations of specimens hatched and reared at 37° C. and either 75 or 84 per cent humidity. It was difficult at times to determine when an individual had molted. It will be observed that in the table occasional molts were apparently missed. The extra number of days between the recorded number of molts in these instances, strongly indicates that a molt had not been recorded.

The nymphs are clothed with scales after the third ecdysis (fourth instar) and in following instars, except when the scales are rubbed off (Sweetman, 1934). Preceding the third ecdysis the scales on the new cuticle can be seen through the old cuticle for a few hours preceding molting. This was observed by Adams (1933) also. The number of days spent in each instar is shown in the table. Ten of the nymphs were observed during development of the ventral abdominal styli only. One day or less is spent in the first instar, about four in the second, about six in the third and fourth, approximately eight days in the fifth to eleventh, and 10 days in the fourteenth to twentieth instars. The following instars average about 12 to 13 days each.

The first pair of ventral abdominal styli appears at the fourth molt (fifth instar). This is the distal pair of styli. The second pair of ventral abdominal styli usually appears on attaining the seventh or eighth instar. The males do not ordinarily acquire the third pair of styli as do the females, which usually acquire this pair in the tenth instar.

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* Contribution from the entomological laboratory of Massachusetts State College.

No distinctive sex characters were observed on living specimens before the eighth instar, at which time the posterior abdominal sternites begin showing the notched appearance, which lengthens into a definite slit by the time the ovipostor appears. About 10 instars are passed at 37° before the ovipostor is visible from a dorsal view.

Several males were added to the cages containing Nos. 3, 4, 5, and 6, as soon as the ovipositors of these females were visible so as to encourage fertilization. Two of these females reproduced, the first ovipositions occuring in the fourteenth and seventeenth instars. Only one lot of eggs is laid during an instar. The last eggs were laid by these females when in the thirty-fifth and thirty-third instars respectively. The instars during which oviposition occurred are indicated in the table.

The number of instars depends entirely on the length of life of an individual. The six individuals passed through from 10 to 42 instars during their lives. Apparently the molting process constitutes a hazard to longevity, at least under the conditions of the experiment. The older living individuals all died following difficulty in extricating the head and thorax from the old cuticle. Some individuals may be so entangled that they are unable to eat during an instar, yet they may successfully emerge during the following molt. This difficulty occurred in both the 75 and 84 per cent humidity environments. The duration of each instar beyond the twentieth is about 12 to 13 days. This is considerably less than indicated in an earlier paper from less intensive observations (Sweetman, 1934). Other individuals in similar environments have lived much longer than the ones under daily observation. One specimen reached an age of 675 days, and a number lived to within a few days of this figure. If the length of the instars beyond the fortieth remained the same this one was in about the sixtieth instar, and undoubtedly some would live longer. One specimen at 32° is over three years old.

Growth continues long after the ovipostor is visible and after the first eggs are laid. Very little change in size was observed after about the thirtieth to thirty-fifth instars. The numbers of segments of the antennae increase rapidly during the first few instars.

The number of instars during the life of *Thermobia domestica.*

Exp.		Instars—Days in each										
No.	Sex	1	2	3	4	5	6	7	8	9	10	11
1	♂	1	4	6	6″	6+	7	7	8*	8	9	10
2	♂	1	4	7	8″	12+	7	6*	6	9	10	7
3	♀	1	4	6	6″	7+	10	9*	10	11	–‡	(20)
4	♀	1	4	6	6″	6+	7	6*	8	6	9‡	8
5	♀	1	4	6	6″	8+	7	7	7*	7	7‡	8
6	♀	1	4	6	6″	8+	7	8	–*	(16)	10‡	died
7	–	–	–	–	6″	6+	7	6	8*	7	8‡	dis.
8	–	–	–	–	9″	8+	6	6	8*	8	dis.	
9	–	–	–	–	7″	6+	6	8	7*	8	dis.	
10	–	–	–	–	7″	6+	6	8	7*	8	dis.‡	
11	–	–	–	–	6″	7+	6	6	8	6*	8	dis.
12	–	–	–	–	8″	7+	7	7	–* escaped			
13	–	–	–	–	6″	7+	6	6	8*	6	8	dis.
14	–	–	–	–	10″	5+	4	11	9*	8	dis.	
15	–	–	–	–	9″	6+	–	(18)*	7	8	dis.	
16	–	–	–	–	7″	6+	6	9	6	6	7	–*

(Continued)

Exp.		Instars—Days in each										
No.	Sex	12	13	14	15	16	17	18	19	20	21	22
1	♂	11	7	9	9	8	11	9	11	12	14	8
2	♂	9	8	9	11	11	6	14	—	(21)	14	18
3	♀	10	10	13°	12	9°	11°	12	12	8°	11°	14°
4	♀	10	11	9	9	9	—°	(23)°	11°	10°	13°	10°
5	♀	7	8	—	(23)	12	11	8 died				

(Continued)

Exp.		Instars—Days in each										
No.	Sex	23	24	25	26	27	28	29	30	31	32	33
1	♂	11	10	13	13	13	16	15	—	(30)	12	13
2	♂	13	11	11	14	13	13	13	16	9	13	14
3	♀	12	15	7	12°	14°	13	12°	12°	13°	13	12
4	♀	—°	(21)°	14	12	13	16	11°	12	11°	15	16°

(Continued)

Exp.		Instars—Days in each								
No.	Sex	34	35	36	37	38	39	40	41	42
1	♂	15	12	13	12	14	10	14	12	13 died
2	♂	14	13	—	(27)	—	(22)	7 died		
3	♀	13	13°	12	14	8 escaped				
4	♀	13	14	11	8	13 died				

″ Clothed with scales in the fourth instar and thereafter.
+ First pair of ventral abdominal styli.
* Second pair of ventral abdominal styli.
‡ Third pair of ventral abdominal styli.
° Oviposited during these instars.
dis. Observations discontinued.

Literature

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NOTES ON THE INFECTION OF THE SEVENTEEN-YEAR CICADA, MAGICICADA SEPTENDECIM (LINN.) BY THE FUNGUS, MASSOSPORA CICADINA PECK.

By Irving J. Cantrall, Ann Arbor, Michigan.

During the late spring and early summer of 1936, the Seventeen-Year Cicada, *Magicicada septendecim* (Linn.) appeared in the region of Ann Arbor, Michigan in countless numbers. The adults began to make their appearance, in Eberwhite's Woods near Ann Arbor, during the first week in June. On the 14th. of the month the tree tops contained hundreds of singing males. A random collection, made in the shrubbery and undergrowth, revealed that the